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SUMMARY

Problem

Medical resource and manpower planners require estimates of the rates of casualties expected for various operational scenarios. These estimates are needed as input to models which project medical supplies, equipment, and personnel required during military operations.

Objective

The Naval Health Research Center has been tasked to determine the likely casualties among naval forces ashore. This population includes personnel organic to the Marine Corps, mobile ashore personnel, and Navy personnel at fixed facilities.

Approach

A representative assignment methodology was employed where likely future combat scenarios were defined and a set of corresponding historic events identified. Random sampling of Muster Rolls and Unit Diaries of Marine infantry battalions was then conducted to determine casualty rates of personnel organic to combat units. Casualty records of medical and construction battalions during WWII, Korea, and Vietnam were similarly analyzed.

Results

Casualty rates of naval ground forces fluctuated with variations in battle intensity. Rate variations between different combat intensities were greatest among those personnel attached to Marine Corps battalions.

Conclusions

The medical resources required to treat naval personnel ashore will be a small proportion of resources allocated to treat ground forces. Manpower planners, however, need to be particularly attentive to the theater replacement needs required to accommodate casualties among these critical personnel.

CASUALTY RATES AMONG NAVAL FORCES ASHORE

INTRODUCTION

Estimates of the casualties anticipated for various operational scenarios are needed by medical and manpower logisticians of all service branches. These casualty forecasts are used as input to models which project the medical resources and theater personnel replacement needs during military operations.^{1,2,3} A 1985 directive by the Chairman of the Joint Chiefs of Staff (JCS) Medical Steering Committee instructed the services to review their respective rate estimates in an effort to plan for needed allocations of equipment, supplies, and personnel, and to determine treatment and evacuation requirements.

Service efforts which arose from this directive include a comprehensive analysis of ground force casualty rate patterns,^{4,5,6} projections of wartime casualty rates among Marine Corps forces,⁷ and estimates of naval casualties afloat during maritime operational scenarios.⁸ Additionally, rates of disease and non-battle injuries (DNBI) have been investigated for inclusion in the medical planning models.^{9,10,11} The Naval Health Research Center (NHRC) has performed a number of analyses investigating casualty incidence^{12,13,14} and consequently was tasked to provide casualty rate estimates for Naval forces ashore.¹⁵

The tasking for the Naval Casualties Ashore study directed NHRC to determine wounded-in-action (WIA) and killed-in-action (KIA) rates among naval ground forces for use as input to the Joint Operations Planning and Execution System's (JOPES) Medical Planning Module and the Navy's Wartime Manpower Planning System (WARMAPS). These models require that casualty rates be estimated for five combat status levels: no combat, light combat, moderate level combat, heavy fighting, and intense combat. NHRC was requested to determine casualty rates for three groupings of Navy personnel: forces organic to the United States Marine Corps, mobile forces

ashore, and personnel stationed at fixed sites. Forces organic to the Marine Corps division include corpsmen attached to infantry battalions as well as the personnel of the Medical Battalion, which provides second echelon medical care. The Mobile Ashore grouping includes personnel of the Construction Battalions and special forces such as Navy SEALs. The third grouping, Fixed Site Navy personnel, is typified by those forces assigned to supply bases, air stations, communications stations, and major Command units.

BACKGROUND

CASUALTY RATE PATTERNS

The recent analysis of casualty rate trends performed by Kuhn⁴ details three critical operational parameters associated with casualty rate experiences. These parameters are a) force size/echelon, b) time period, and c) scenario/sector. The first parameter refers not only to the numerical strength of the unit but also to its function. For example, a unit may be of division-size strength but if it is operating as a brigade or battalion, then its rates would more closely resemble those of the smaller units.

The second parameter which greatly impacts observed casualty rates is time. The nature of combat yields rates which fluctuate over time, reflecting pulses and pauses in combat activity levels. Consequently, much more variability will be seen in daily casualty rates than in weekly or monthly rates. Kuhn has also shown that, as mean rate over time increases, there is a parallel increase in daily rate variation.

The third major parameter influencing casualty rates is the general operational setting, or scenario. The scenario is based on doctrinal, strategic, and tactical considerations and is intertwined with sector, which defines posture (offensive vs. defensive) and function (main attack vs. secondary attack). Scenario and sector determine whether the battle front is continuous or disrupted, and casualty rates have been shown to vary with the type of front.

METHODS OF DEFINING COMBAT INTENSITY LEVELS

Manpower planning and medical resource allocation models require casualty rate estimates for varying battle intensities. Definitions of the various battle intensities, however, are rarely consistent across operational scenarios. The definitions of intensity levels for naval afloat casualty rates, for instance, are tied to the percentage of ships sunk and to the degree of damage to those ships of the task force which are not sunk.⁸ A second methodology, used in the Marine casualty rate study, defined intensity levels in terms of the percentage of maneuver forces engaged, combined with rating factors of terrain, climate, enemy strength, etc.⁷ A third strategy, employed in the original intensity level definitions of the medical planning module of JOPES, based intensities on the percent of force maneuver echelon and fire support means that were engaged.

As the Gulf War demonstrated, however, it is possible to have a large percentage of forces engaged, and yet not encounter the resistance normally associated with high-intensity combat. For this reason, it is important that definitions of intensity levels incorporate the degree of resistance met by the troops engaged.

Historical accounts which provide anecdotal assessments of battle intensity undoubtedly take into consideration the number of casualties sustained. While incorporating degree of enemy resistance, this approach to defining battle intensity can also lead to circular definitions of battle tempos and casualty rates. That is, a specific intensity level is defined by a particular range of casualties sustained, while a range of casualties becomes redundant with a specific intensity level.

A similar method to using specific casualty rate ranges to define intensity level is the strategy employed in the Long Range Medical and Dental Support Study System.¹⁶ This approach rated certain military operations as high, medium or low intensity. The casualty rates from these operations were then determined and used to represent various intensity levels. Scaling factors were

applied to these historical rates to make them representative of contemporary warfare.

ASSIGNMENT APPROACH

Each of the previously mentioned methods of defining battle intensity has its advantages and drawbacks. Sufficient historical data, in any case, does not exist to allow naval ashore rates to be estimated from maneuver forces and/or firepower engaged. Estimation of casualty rates, then, requires an initial determination of whether the assignment of empirically-based, previously observed rates to future operations is more reliable than what Kuhn⁵ refers to as the 'calculation method', which bases estimates on the specifics of the force and scenario. While the calculation method has the advantage of being more contemporary and technically appealing than the 'assignment method', quantification of all factors which influence casualty rates may be impossible. Besides the three major parameters (force, time, scenario), rates are influenced by terrain, climate, unit leadership, training, morale, weapon types, and various factors related to the enemy. Use of the calculation method would require that numerical scores be applied to each factor and then algorithms derived for each scenario.

Assignment of rates from previous scenarios, if they are indeed representative of future operations, may yield more reliable estimates because they are firmly grounded in operational reality. Rather than dismissing the many aforementioned variables as unimportant, use of rates from past operations factors them into account collectively, rather than trying to quantify each one individually. Additionally, Kuhn⁴ indicates that rates and operational patterns for comparable force sizes and scenarios have not changed appreciably since the mid-1940s. This finding comes from comparisons of casualty incidence of WWII, Korea, the 1967 and 1973 Middle East Conflicts, and field exercises at the National Training Center.

Selection of appropriate previous Naval forces ashore experiences is critical to the generalizability of the previous casualty rates to future operations. This task is made considerably easier by the knowledge that the bulk of Naval ground forces carry out the same functions today as they have since World War II; Marine Infantry Battalions continue to have hospital corpsmen deployed with them, Medical Battalions continue to provide second echelon medical care for the Marines, and Construction Battalions continue to support Marine Corps operations by erecting buildings and constructing roads, bridges, and airstrips.

The common denominator to these Naval ground forces is their support of Marine Corps operations. Certainly some naval personnel operate independently of the Marines, but for planning purposes attention should be focussed on the bulk of the personnel ashore, i.e., medical and construction forces.

METHOD

It is important that planning figures come from operations that are similar to future scenarios. The break-up of the Soviet Union combined with the disintegration of the East Bloc make full scale war in Europe a much less likely occurrence than it was a decade ago. Casualty rates for Navy ground forces, therefore, should represent conflicts in which the Marines may realistically be involved in the post-Cold War era.

A representative assignment methodology has been employed where probable future scenarios are defined and then similar historic operations are identified. Random sampling of the data from the historical operations was then conducted. Rates computed from this data, then, were used as estimates for the future scenarios.

PROBABLE FUTURE SCENARIOS

While the Marines were not used as an amphibious assault force during Desert Storm, the threat of a Marine amphibious invasion

tied down seven Iraqi divisions.¹⁷ Though the Marines are less likely to storm well-defended beaches in the future than they did in the past, amphibious power projection is a role that the Marines will continue to be expected to perform. A second major role, that of crisis response, was evident as the Marines provided the first truly viable defensive force to arrive on the scene in the early days of Desert Shield. Third, Marine Corps offensive functions will continue as a complement to Army mechanized and armored divisions, as also witnessed in Desert Storm. In summary, future military campaigns will likely see the Marines used in amphibious operations,¹⁸ moderate-intensity warfare,¹⁹ and as an adjunct to the army in wars of movement.¹⁷

HISTORICAL DATA SELECTED

Given that Marine involvement in a future full-scale ground war is less likely than in the past, the most representative data of future naval ground force casualties comes from previous mid- and low-level intensity conflicts, as well as amphibious operations. Data from amphibious assaults with relatively unopposed landings are most apt to reflect future amphibious operations.

Marine Corps operations during mid-1951 of the Korean Conflict combined static warfare with periodic advances, and therefore may parallel future moderate-intensity actions in which Navy medical personnel organic to infantry battalions will be involved. Likewise, the Marine operation on Okinawa--which had a relatively unopposed landing--had phases reflecting the full range of combat intensities, and may also characterize casualty rates of medical forces attached to combat troops during a future scenario.

Casualty rates from Medical Battalions and Construction Battalions serving in Korea and Okinawa will be used to represent moderate and heavy combat levels, respectively. Casualty estimates of light and intense battle levels for medical and construction units will come respectively, from Vietnam, where the overall battle tempo was generally low, and Iwo Jima, site of one the

fiercest Western Pacific battles.

Navy Attached to Infantry Battalions

Data extracted from two sources, Marine Corps Muster Rolls and Unit Diaries, included Navy personnel who were wounded and killed, the number of Navy personnel attached to each unit, and the dates of the casualties. The Muster Rolls are housed at the National Archives and the Unit Diaries are archived at the Marine Corps Historical Center, both located in Washington, D.C.

Eighteen Marine infantry battalions from the 1st and 6th Divisions participated in the Okinawa assault and yielded 54 monthly Muster Rolls for the three-month combat period. Thirty-three of these muster rolls were randomly selected for analysis; 22 of these muster rolls had data recorded for naval forces attached to the infantry units, representing 24,257 mandays.

Additionally, 20 of the 46 companies comprising the infantry regiments of the 1st Division serving in Korea were randomly selected for analysis. These companies represented 11 of 23 rifle units deployed, four of six weapons companies, and five of ten Headquarters & Service companies. Unit diaries for 8 of the 20 companies indicated that Navy personnel were attached; these naval personnel accounted for 23,989 mandays during the five-month period from February to June, 1951.

Medical and Construction Battalions

Bureau of Personnel (BUPERS) casualty rolls reporting the personnel wounded and killed from all three medical battalions (27,425 mandays) and four of the five construction battalions (100,275 mandays) involved in the Iwo Jima campaign were examined. Likewise, BUPERS casualty records from both medical battalions (72,941 mandays) and 11 of the 19 construction battalions (717,082 mandays) serving in the Okinawa operation were extracted. These records, kept at the Navy Historical Center in Washington, D.C., contain data on the type of casualty (WIA or KIA), the date of casualty, and the operation or engagement in which each individual

casualty was participating. Strength data for the medical and construction battalions were extracted from the Muster Rolls at the National Archives.

Data from Personnel Diaries of the Beachmaster Units and Construction Battalion units serving in the Korean Conflict during 1951 were also extracted. These National Archives records yielded the strength of each unit, along with the names and dates of those personnel hospitalized. These names were then compared with BUPERS casualty lists for Korea to determine if the hospitalized personnel were casualties or DNBI (disease and non-battle injury) admissions. Hospitalization data on casualties among the 21 Construction Battalions serving in Vietnam were also obtained.

DATA POINTS OF BATTLE INTENSITY LEVELS

Official historical accounts of Marine Corps operations^{20,21} were examined for anecdotal information detailing the combat intensity levels corresponding to different time frames of the Okinawa operation and the Korea Conflict. Because the Okinawa assault was of relatively short duration (three months), historical accounts of battle intensity levels associated with different combat units during the operation were available. Detailed information on intensity levels was not available for the more protracted Korea operation.

Navy Forces with Infantry Battalions

Because detailed information pertaining to enemy resistance was available for Marine Corps units during the Okinawa operation, combat intensity levels could be determined for the Navy forces accompanying the infantry battalions. The information extracted from the official histories was used to define the following weekly levels of battle tempo: Light -- no other level of combat during the week than that characterized by historians as 'light'; Moderate -- there was at least one day characterized as 'heavy' or there was no more than one day in the seven day period characterized as 'intense' combined with one or more days of 'light' combat; Intense

-- there were at least two days in the week characterized as being 'intense' with the rest being 'heavy'. These definitions yielded a number of 'unit by week' combinations which did not fit into any battle intensity level.

Medical Battalions

Historical accounts do not report the daily activities and enemy attacks upon medical battalions. The casualty rate from Iwo Jima will be used as the standard for Intense combat for medical units, while the Okinawa experience will serve as the Heavy intensity designate. Because no specific casualty data was found for Navy medical battalions in Korea, the casualty rate for all Army medical battalions serving in Korea²² will be used to represent Moderate combat intensity. This rate was based on an average of 1,900 personnel over a three-year period.

Construction Battalions

Rates occurring in Iwo Jima and Okinawa will be assigned as Intense and Heavy battle tempos for construction battalions. The experiences of Navy Construction Battalions in Korea and Vietnam will be used to represent rates for Moderate and Light levels of combat, respectively.

RESULTS

NAVY ATTACHED TO COMBAT TROOPS

The overall casualty rate for Navy forces with the Marine infantry battalions during the Okinawa assault was 3.83 per 1000 men per day. The WIA rate separately was 3.01, while the KIA rate was 0.82. There were marked fluctuations between battalions--some battalions had zero casualties, while two battalions had rates averaging over 15 per 1000 per day. Likewise, there was substantial variation in the daily rates across all battalions in the Okinawa operation. Figure 1 illustrates the fluctuations in

the casualty rates of Navy personnel organic to the infantry battalions during the assault on Okinawa.

The overall casualty rate for Navy forces attached to Marine infantry battalions during a five month period (February - June 1951) of the Korean Conflict was 3.00 per 1000 per day. This rate was composed of a WIA incidence of 2.88 and a KIA rate of 0.12. Figure 2 is a display of the daily variations in WIA and KIA. While several casualty pulses are extreme, it should be noted that this graph represents an average strength of 160 men per day; consequently, small shifts in the numbers of casualties can lead to large fluctuations in the daily rates.

Figure 3 depicts the casualty rates among Navy personnel attached to infantry units in Okinawa during different combat intensity levels. The Navy rates for moderate and intense combat are, respectively, three-quarters and half as large as the rates observed for the Marines themselves under these conditions.²³

MEDICAL BATTALIONS

Substantial differences were evidenced in the casualty rates of medical battalions in different combat scenarios. The overall casualty rate for medical battalions in the Intense combat scenario (Iwo Jima) was 7.5 per 1000 per day, while the rate dropped to 1.57 for a Heavy combat level situation (Okinawa) and 0.046 for a Moderate intensity operation (Korea). The rates of WIA and KIA for the various intensities are displayed in Figure 4.

CONSTRUCTION BATTALIONS

The decreases in casualty rates were even more dramatic for Construction Battalions serving in combat scenarios of lessening intensities. The casualty rate for SeaBees in the operation defined as Intense was 2.16 per 1000 men per day; the rate for construction forces dropped to 0.091 under the assigned Heavy combat scenario. There were no KIAs among the Construction units serving in Korea and, while there may have been some minor wounds,

none of the hospital admissions among the SeaBees deployed to Korea had a casualty cause code. Among the twenty-one battalions serving in Vietnam there were 85 KIAs and 256 recorded inpatient admissions for battle wounds. The casualty rates of construction battalions corresponding to these battle scenarios are graphed in Figure 5.

SPECIAL FORCES

Though constituting a small percentage of Naval forces ashore, some data were available on casualties among Navy SEALs. Casualty incidence among SEALs tends to fluctuate more by the nature of the missions they embark upon than by the overall intensity of a conflict. This was borne out by the following statistics: SEALs carried out over 270 operations during the Gulf War without injury or death,²⁴ yet, during the brief (four day) Grenada Operation a single eight-man team sustained four KIA and two WIA on one mission, and a second eleven-man team suffered 10 WIA on another mission.²⁵

FIXED FACILITIES

No complete data was found detailing casualties sustained among Navy fixed facilities under any combat intensity. A Naval Operating Base on Okinawa was found to have sustained 17 WIA and 8 KIA in a single day, but denominator (strength) data was not available to compute casualty rates. In future operations, it is highly likely that any fixed facilities will be constructed in areas that are considered well-secured. However, as the Scud missile that struck an Army barracks in Saudi Arabia demonstrates, in this day of advanced technology no area within the theater of operations can be considered risk-free.

PLANNING FIGURES

The preceding analyses have been used to estimate the rates of WIA and KIA which might be sustained under varying battle

intensities among Naval forces ashore. These estimates, found in Appendix A, are classified and available only to DoD personnel with appropriate clearance. Requests should be made to the Navy Operations and Plans Branch (OP-603), Office of the Chief of Naval Operations, Washington, D.C.

DISCUSSION

Medical resource planners and manpower logisticians need estimates from all service branches of the expected levels of casualties during military operations. These casualty projections are used as input to models which determine the medical supplies and equipment required, as well as the personnel replacement needs. The 'assignment method' of estimating casualties of future scenarios from previous operations with underlying similarities was employed. Because the functions of naval forces ashore have changed little over the past five decades, this method was thought to be more reliable than attempting to individually quantify the effects of terrain, morale, leadership, and climate, as well as factors relating to an unknown enemy.

The preceding analyses indicate that naval forces ashore, like conventional ground forces, evidence fluctuations in casualty rates with battle intensity. Navy personnel providing first and second echelon medical care, and to a lesser degree, construction forces, are all at risk of becoming casualties during military operations. Also, though the casualty rates of special forces such as Navy SEALs are more mission-dependent than linked to an overall level of battle intensity, these personnel are likewise at substantial risk of becoming combat casualties.

The medical resources required to treat casualties among naval ashore personnel will be a small proportion of the total resources allocated to treat all ground forces. Manpower planners, however, must be particularly attentive to the theater replacement needs required to accommodate casualties among these critical personnel.

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FIGURE 1. DAILY WIA AND KIA RATES AMONG NAVAL FORCES ORGANIC TO U.S. MARINE CORPS INFANTRY UNITS DURING THE OKINAWA OPERATION

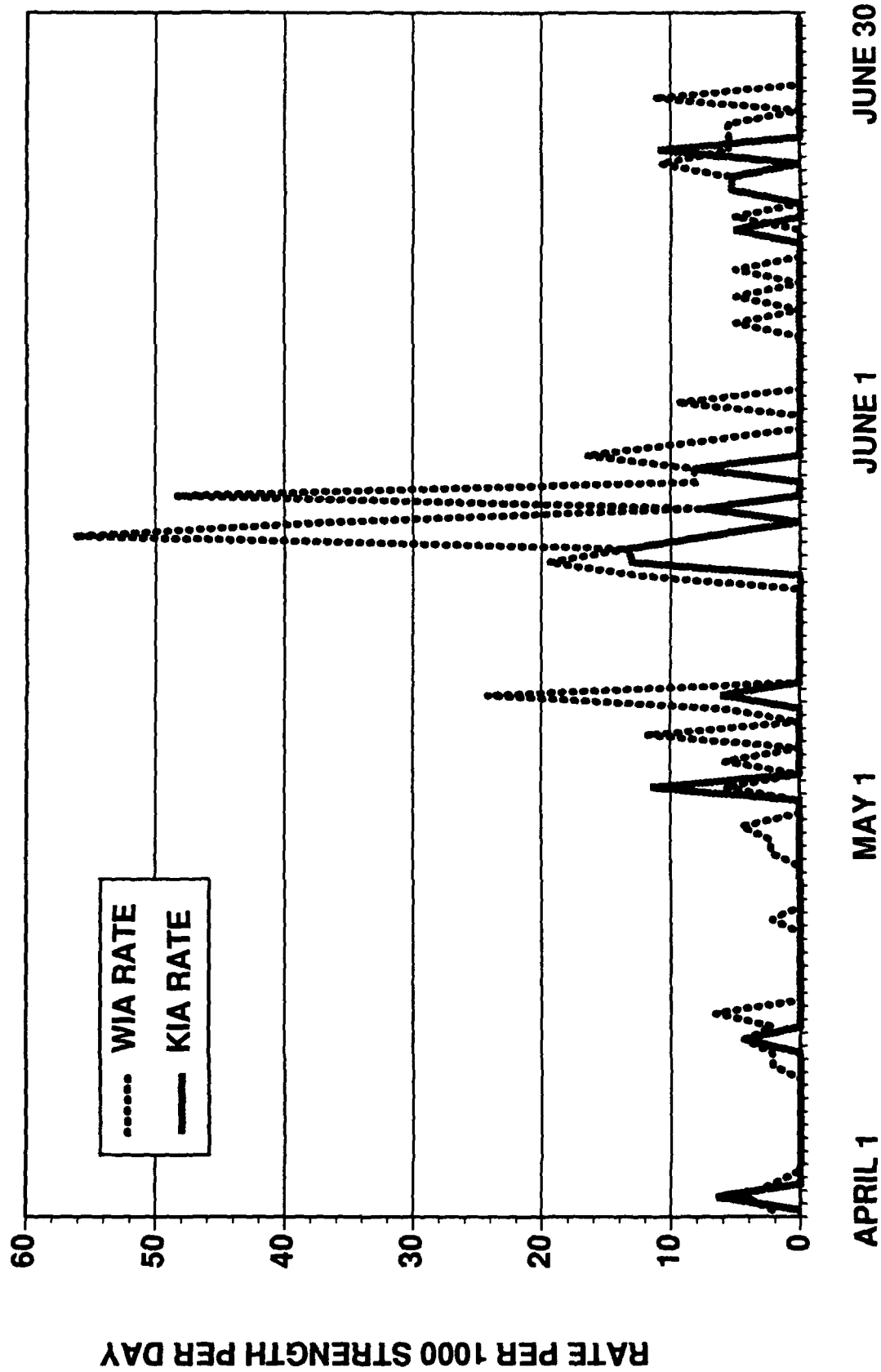


FIGURE 2. DAILY WIA AND KIA RATES AMONG NAVAL FORCES ORGANIC TO U.S. MARINE CORPS INFANTRY UNITS DURING THE KOREAN WAR

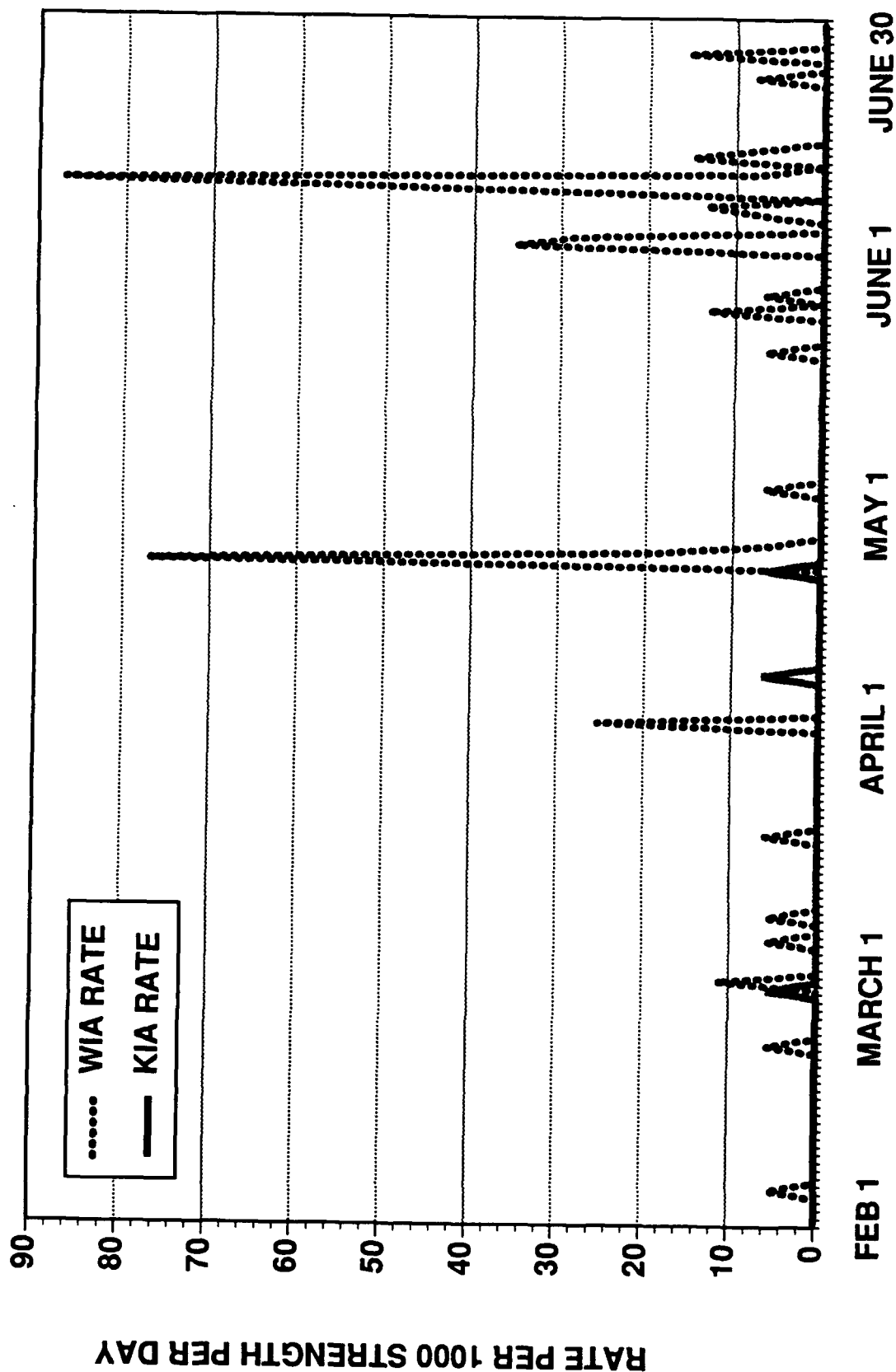


FIGURE 3. CASUALTY RATES BY BATTLE INTENSITY AMONG NAVY PERSONNEL ORGANIC TO MARINE CORPS INFANTRY BATTALIONS; OKINAWA OPERATION, 1945

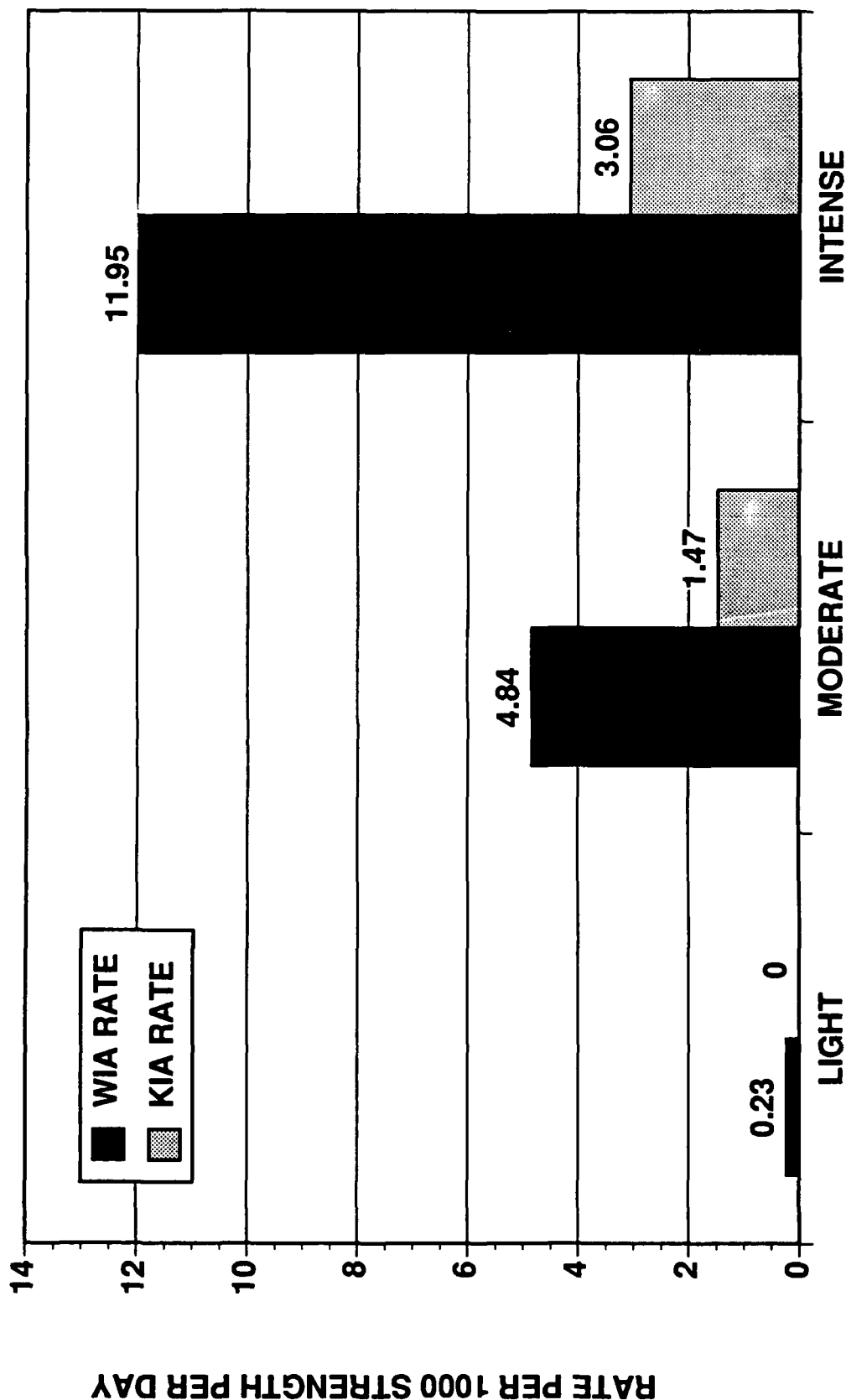


FIGURE 4. CASUALTY RATES OF MEDICAL BATTALIONS DURING INTENSE, HEAVY, AND MODERATE LEVEL COMBAT SCENARIOS

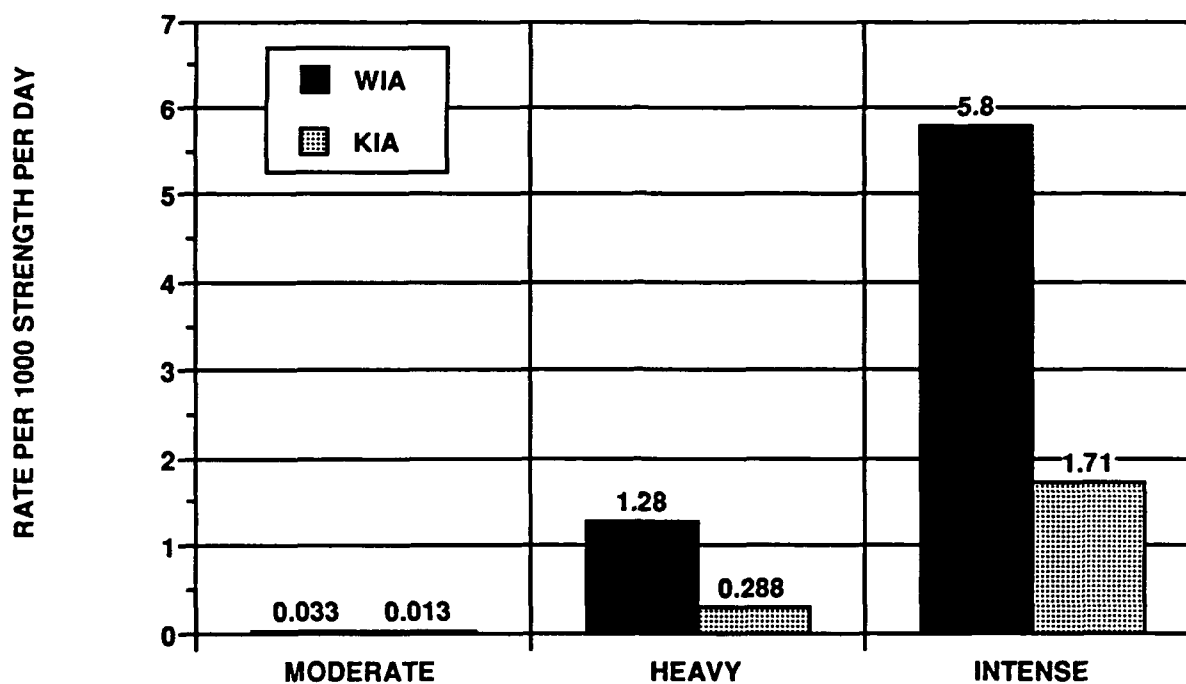
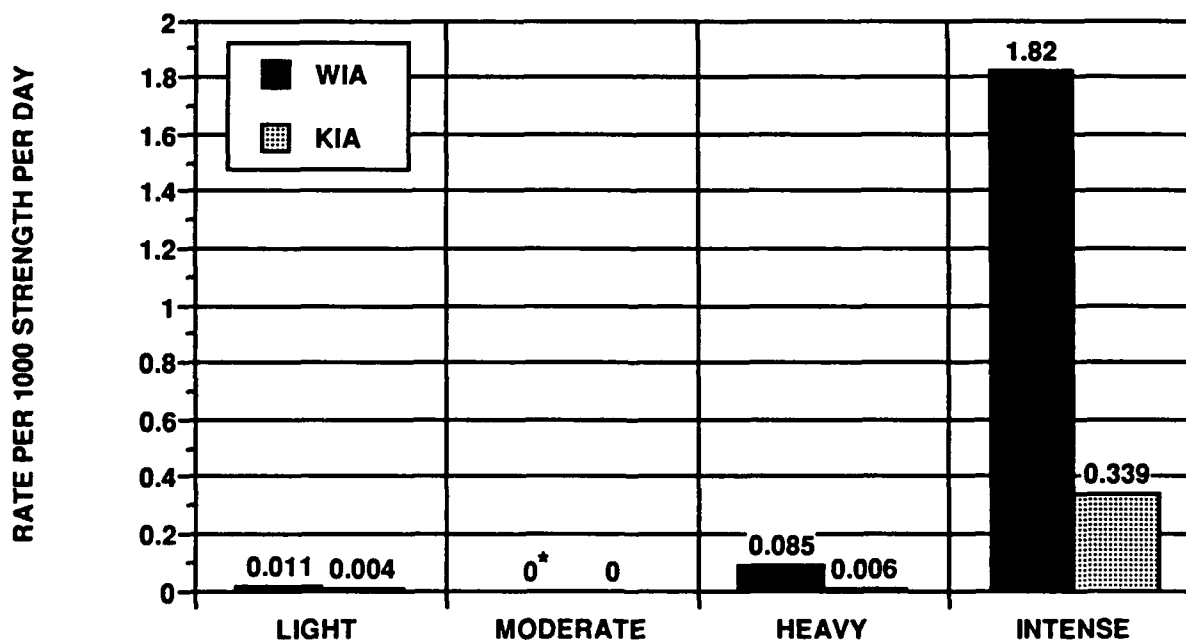


FIGURE 5. CASUALTY RATES OF NAVY CONSTRUCTION BATTALIONS DURING INTENSE, HEAVY, MODERATE, AND LIGHT BATTLE INTENSITY OPERATIONS



*No hospital admissions for battle wounds were found in records.

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